

9.

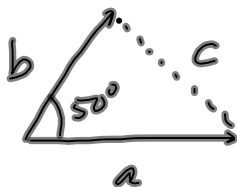
$$\sum_{n=1}^{\infty} \frac{2^n}{n+3} = \frac{1}{2} + \frac{4}{5} + \frac{8}{6} \dots \quad \text{geo?} \quad \frac{a}{1-r}$$

$$\checkmark \sum_{n=1}^{\infty} \frac{-8}{(-3)^n} = \frac{8}{3} - \frac{8}{9} + \frac{8}{27} \dots \quad \frac{\frac{8}{3}}{1 - (-\frac{1}{3})} = \frac{\frac{8}{3}}{\frac{4}{3}} = 2$$

$$\checkmark \sum_{n=0}^{\infty} \frac{1}{2^n} = 1 + \frac{1}{2} + \frac{1}{4} \dots \quad \frac{1}{1 - \frac{1}{2}} = \frac{1}{\frac{1}{2}} = 2$$

Mar 19-11:27 AM

4.



$$\frac{da}{dt} = 35 \text{ mph} \quad \frac{db}{dt} = 28 \text{ mph}$$

$$\text{find } \frac{dc}{dt}$$

$$c^2 = a^2 + b^2 - 2ab \cos 50^\circ$$

$$2c \frac{dc}{dt} = 2a \frac{da}{dt} + 2b \frac{db}{dt} - 2 \cos 50^\circ \left(a \frac{db}{dt} + b \frac{da}{dt} \right)$$

$$a=70 \quad b=56 \quad c = \sqrt{70^2 + 56^2 - 2 \cdot 70 \cdot 56 \cos 50^\circ}$$

Mar 19-11:40 AM

2. $2 \frac{\text{in}^3}{\text{min}}$ rate of change of volume

how fast is surface area decreasing? when $r=1$



V = volume

S = surface area

r = radius

$$\frac{dV}{dt} = -2 \frac{\text{in}^3}{\text{min}}$$

find $\frac{dS}{dt}$

$$V = \frac{4}{3} \pi r^3$$

$$S = 4\pi r^2$$

$$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$$

$$-2 = 4\pi \cdot 1^2 \frac{dr}{dt}$$

$$\frac{dr}{dt} = \frac{-2}{4\pi} = -\frac{1}{2\pi}$$

$$\frac{dS}{dt} = 8\pi r \frac{dr}{dt}$$

$$= 8\pi \cdot 1 \cdot -\frac{1}{2\pi}$$

$$= -4 \frac{\text{in}^2}{\text{min}}$$

Mar 19-11:54 AM

Review 13 Implicit Differentiation

$$x^2 + y^2 = 9 \quad \text{find } \frac{dy}{dx}$$

$$2x + 2y y' = 0$$

$$y' = -\frac{x}{y}$$

$$y'' = \frac{y(-1) - (x)y'}{y^2} = \frac{-y + x\left(-\frac{x}{y}\right)}{y^2} = \frac{-y^2 - x^2}{y^3} = \frac{-(y^2 + x^2)}{y^3} = \frac{-9}{y^3}$$

Mar 19-12:07 PM

$$x^2 + 2xy - y^2 = 7$$

find $\frac{dy}{dx}$

$$2x + 2x \cdot y' + y \cdot 2 - 2yy' = 0$$

$$2xy' - 2yy' = -2x - 2y$$

$$y'(2x - 2y) = -2x - 2y$$

$$y' = \frac{-2x - 2y}{2x - 2y} = -\frac{(x+y)}{x-y}$$

Mar 19-12:17 PM